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## Exploring international legal governance of global solar fuels

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### Abstract

This paper critically examines the role of international law in establishing the appropriate governance framework for enhanced global collaboration on solar fuels. It will particularly evaluate the right to enjoy the benefit of scientific progress and its applications (REBSPA) in article 15 of the United Nations *International Covenant on Civil and Political Rights*. Consideration will also be given to the role of declaring natural and artificial photosynthesis 'common heritage of mankind' under a UNESCO Declaration and ultimately a United Nations Convention and the impact this might have in relation to intellectual monopoly privileges (IMPs) such as patents and their capacity to advance or hinder progress in the field. It also briefly considers the role that trade and investment law and the possibility of a global carbon price may have in shaping the solar fuels field.

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### 1. Exploring the international legal framework for global solar fuels

There are many components of international governance regimes to which a Global Solar Fuel (GSF) initiative would be directly relevant. These could either assist to create such an initiative or work to prevent or impede it.

Probably in the former category is the 2009 *Copenhagen Accord*— a non-binding political agreement that recognized the critical impacts of population growth and fossil fuel-driven climate change as well as the need to establish a comprehensive adaptation program including international support for those countries most vulnerable to its adverse effects.<sup>[1]</sup> For the first time, all major CO<sub>2</sub>-emitting countries agreed to a target of keeping global warming to less than 2°C above pre-industrial levels. It contained important undertakings concerning mitigation including the Copenhagen Green Climate Fund and establishing a mechanism to accelerate renewable energy technology development and transfer.<sup>[2]</sup> Other important internationally agreed targets to reduce poverty and lack of necessary fuel and food, to encourage environmental sustainability and global technological cooperation are expressed in the United Nations *Millennium Development Goals*.<sup>[3]</sup> Principles supporting similar goals (and directed to individuals, communities and private corporations and well as States (article 1)) appear in the UNESCO *Universal Declaration on Bioethics and Human Rights* (particularly the social responsibility principle in article 14(b)— 'access to adequate nutrition and water', 14(c)—'improvement in living conditions and the environment' and 14(e)— reduction in poverty and illiteracy').<sup>[4]</sup>

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Other international law concepts that could be influential in fleshing out governance-wise the concept of planetary nanomedicine are those that may declare Global Artificial Photosynthesis a global public good,<sup>[5]</sup> an aspect of technology sharing obligations,<sup>[6]</sup> or those arising under the international right to health (set out for example in article 12 of the United Nations *International Covenant on Civil and Political Rights*)<sup>[7]</sup>

The UNESCO *Declaration on the Responsibilities of the Present Generations Towards Future Generations* expresses a concept of planetary common heritage in article 4:

“The present generations have the responsibility to bequeath to future generations an Earth which will not one day be irreversibly damaged by human activity. Each generation inheriting the Earth temporarily should take care to use natural resources reasonably and ensure that life is not prejudiced by harmful modifications of the ecosystems and that scientific and technological progress in all fields does not harm life on Earth.”<sup>[8]</sup>

## 2. International trade and investment law and global solar fuels

Yet international trade, and more particularly international trade and investment law, lies at the heart of the corporate globalisation process driven by a very different set of norms, by which foreign capital takes advantage of abundant natural resources (particularly timber, oil, coal and minerals) or cheap labour, to manufacture products for distribution and profitable sale throughout the world using road, rail, sea and air freight transport, reduced tariffs and mass marketing techniques.

The World Trade Organisation (WTO) is headquartered in Geneva near many of the United Nations human rights organisations with which it normatively has so little in common. The WTO is comprised of a secretariat and public officials from nation states who have been involved in agreements (such as the *Trade Related Intellectual Property* (or TRIPS) agreement and the *General Agreement on Trade in Services* (GATS) by which those states agree to not merely reduce various trade barriers, but to allow supranational corporations to take control of major national assets (such as intellectual property, hospital and health services, water, agriculture, power-generation and manufacturing) in a way that is very hard to undo (due to the compensation to corporate stakeholders that must be paid by taxpayers). What has been created in other words is a supranational corporation-controlled legal system that is pushing global governance in directions different to those of democratic-based community and civil society institutions committed to societal virtues such as justice, equity and, increasingly, environmental sustainability.

A particular tactic of particular concern as a potential obstacle to global roll-out of GSF products are attempts by supranational corporations to influence global governance regimes by means of so-called ‘investor state’ dispute settlement provisions. In the 1990’s civil society prevented the creation of a supranational investment protection agreement (the *Multilateral Agreement on Investment* or MIA) that would have allowed the global implementation of such provisions, but they have nonetheless proliferated in a series of bilateral and regional arrangements. Basically they allow supranational corporations to sue (before small panels of commercial arbitration lawyers with little understanding of or desire to apply international public law) other nations who have imposed governance requirements (even when in the public health and environmental interest based on good scientific evidence) if their commercial interests are thereby impeded. Investor-state provisions surfaced in the failed Multilateral Investment Treaty (MAI) in the 1990’s and in the 1994 *North American Free Trade Agreement* (NAFTA) between the United States (US), Canada and Mexico.<sup>[9]</sup> They are now part of over 2000 bilateral investment treaties (BITs).<sup>[10]</sup> They grant investors covered by them a right to initiate dispute settlement proceedings (before a panel of trade lawyers known as commercial arbiters) for damages against foreign governments in their own right.<sup>[11]</sup> Should GSF products begin to look as if they are likely to replace those upon which supranational corporations have substantial investments (in say old photosynthesis fuels or electricity distribution networks), then those corporations may well resort to investor state mechanisms to protect their profits and inhibit the roll-out.

## 3. Natural and artificial photosynthesis as the common heritage of humanity

An enhanced global policy focus on solar fuels may involve facilitated collaboration between existing networks or works towards a macroscale GSF Project. In either case international law may provide an important governance framework.

A GSF Project governance structure emphasizing international law might protect photosynthesis from excessive patents promoting inequitable or unsustainable use within the class of United Nations treaties involved with protecting the common heritage of humanity (such provisions cover, for instance, outer space,<sup>[12]</sup> the moon,<sup>[13]</sup> deep sea bed,<sup>[14]</sup> Antarctica<sup>[15]</sup> and world natural heritage sites<sup>[16]</sup>). Five core components are generally regarded as encompassing the common heritage of humanity concept under public international law. First, there can be no private or public appropriation; no one legally owns common heritage spaces or materials. Second, representatives from all nations must manage such resources on behalf of all (this often necessitating a special agency to coordinate shared management). Third, all nations must actively share with each

other the benefits acquired from exploitation of the resources from the commons heritage region, this requiring restraint on the profit-making activities of private corporate entities and linking the concept to that of global public good. Fourth, there can be no weaponry developed using common heritage materials. Fifth, the commons should be preserved for the benefit of future generations.<sup>[17]</sup> <sup>[18]</sup>

Probably the closest analogies involve claims that genetic diversity of agricultural crops,<sup>[19]</sup> plant genetic resources in general,<sup>[20]</sup> biodiversity<sup>[21]</sup> or the atmosphere<sup>[22]</sup> should be treated as not just areas of common concern but subject to common heritage requirements under international law.

GSF research and development will also face major issues about whether intellectual monopoly privileges (IMPs) such as patents should cover GSF products as well as processes and functions.<sup>[23]</sup> It is likely that in the US the 'utility' for a GSF patent (as is the case for DNA) will be that it must be specific, substantial and credible.<sup>[24]</sup> If GSF patent ownership becomes fragmented, researchers in the field may find their 'follow-on' research hampered by the high cost and difficulty in negotiating contracts with large numbers of GSF patent owners. Each individual GSF patent owner, for example, without some prior licensing and sharing arrangement, will have an incentive to overcharge other researchers requiring access.<sup>[25]</sup>

A statement in such a UNESCO Declaration that photosynthesis (in either its natural or artificial forms) was the common heritage of humanity could be important in wider governance moves to restrict corporate ownership through intellectual property rights or misuse by nation states for strategic or military purposes. Other questions may involve developing specific principles by which artificial photosynthesis technology can best address within defined time pressures critical problems of global poverty and environmental degradation.<sup>[26]</sup> <sup>[27]</sup>

#### 4. REBSPA

Article 15 of the United Nations *International Covenant on Civil and Political Rights* (ICESCR) is directly relevant to a nanotechnology-based GAP or GSF project. It sets out the right to enjoy the benefit of scientific progress and its applications (REBSPA). It provides:

1. The States Parties to the present Covenant recognize the right of everyone:
  - (a) To take part in cultural life;
  - (b) **To enjoy the benefits of scientific progress and its applications;**
  - (c) To benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.
2. The steps to be taken by the States Parties to the present Covenant to achieve the full realization of this right shall include those necessary for the **conservation, the development and the diffusion of science and culture.**
3. The States Parties to the present Covenant undertake **to respect the freedom indispensable for scientific research and creative activity.**
4. The States Parties to the present Covenant recognize the benefits to be derived from the **encouragement and development of international contacts and co-operation in the scientific and cultural fields.**

Would this, for example, justify flexibilities to WTO, bilateral and regional trade agreements IMP provisions or a 0.05% tax on global financial transactions to fund a GSF project? A major challenge to interpreting this right involves defining its core components. On one approach the core component of the REBSPA aims to protect, fulfil and respect the scientific enterprise insofar as it contributes to achieving human rights obligations. It aims to protect the capacity of the scientific enterprise to bring benefits to everyone through encouraging measures that permit critical analysis, honesty and objectivity amongst scientific researchers and their employers, facilitate government regulatory systems based on scientific evaluation of the risks, benefits and cost effectiveness of new technologies. The right may be viewed as seeking to support mechanisms whereby tradition knowledge may be incorporated into the scientific enterprise according to standards supported by international human rights. For the purposes of this right it is expected that states have an obligation to ensure that science conducted within their boundaries is coherent with international human rights.

Article 15 (2) refers to 'conservation, development and diffusion' of science as amongst the steps to be taken by States Parties to achieve full realization of the right. Challenges to interpretation of the right in this context include the extent to which 'conservation' refers to measures to prevent loss of scientific expertise and infrastructure particularly in developing nations. Measures for consideration here include how policies of developing nations to retain scientific expertise relate to WTO GATS obligations. Challenges with respect to 'development' of science include reporting obligations on investments by State Parties in science education, grant funding and science infrastructure. Challenges with respect to 'diffusion' include responsibilities of States Parties to facilitate community access to scientific information, fostering of open scientific debate and appropriate use of science in regulatory processes. Amongst the challenges to be addressed here include the creation of mechanisms whereby public-funded research can recoup a reasonable percentage of profits ultimately produced by private sector involvement in research development, maintenance of the 'research-use' exemption for public funded universities, and measures to prevent any systematic inhibition, misrepresentation or concealment of scientific data by private or public research organisations.

Table 2. International Legal Governance of Global Solar Fuels

	GSF coherent	Incl. GSF Policy
ICESCR Article 15(2) 'conservation, development and diffusion' of science	Yes	No
ICESCR Article 12 'right to health'	Yes	No
UNESCO UDBHR Article 14	Yes	No
World Bank Policies	No	No
UN Millennium Development Goals	Yes	No
World Trade Organisation agreements	No	No
UN	Yes	No

## 5. Relationship of global solar fuels to a global carbon price

One key area of international governance a Global Artificial Photosynthesis (GAP) or Global Solar Fuels (GSF) project is likely to have to interact with is a global carbon price, perhaps introduced by an international convention. In Australia, from 1 July 2012, the carbon price will be \$23 per tonne rising at 2.5 per cent per annum in real terms.<sup>[28]</sup> From 1 July 2015, transition will occur to a fully flexible market price. This Emissions Trading Scheme (ETS) has broad coverage- stationary energy sector, industrial processes, non-legacy waste, and fugitive emissions (other than from decommissioned coal mines). Transport fuels- liquid petroleum fuels, liquid petroleum gas, liquefied natural gas and compressed natural gas are excluded. Between 2015-2018 a price ceiling will be set at \$20 above the expected international price; to rise by 5 per cent each year; the floor price being \$15, rising annually by 4 per cent. Associated with the new scheme will be a new \$10 billion commercially oriented Clean Energy Finance Corporation that will invest in renewable energy, low pollution and energy efficiency technologies, and a new Australian Renewable Energy Agency (ARENA) to administer \$3.2 billion in Government support for research and development, demonstration and commercialisation of renewable energy. The Renewable Energy Target and the carbon price are expected to drive \$20 billion of investment in large-scale renewable energy by 2020.<sup>[29]</sup>

Other jurisdictions are making progress in this direction. The European Union (EU) Energy and Climate Policy aims to reduce GHG emissions by 20% and increase renewable energy by 20% by 2020. The EU Strategic Energy Technology Plan (SET-Plan) aims to accelerate development of low carbon technologies and ensure their widespread market take up. The European Industrial Initiative on Electricity Grid- aims to enable 35% EU electricity from dispersed and concentrated renewable sources by 2020 and completely decarbonised electricity production by 2050.

The *American Clean Energy and Security Act 2009* (Waxman-Markey Bill) has passed the US federal House of Representatives but is stalled in the Senate. It aims for a 17% reduction in carbon emissions by 2020 and 80% by 2050 and 20% increase in renewables by 2020. It provides extra funding for energy efficiency and renewable energy-US\$90 billion by 2025, and basic scientific R&D by US\$20 billion. Likewise the *Save Our Climate Act* (HR 3242) Rep Stark (D-CA) seeks to impose a tax on carbon dioxide at well, mine, port of entry at \$10/ton rising by \$10/ton per year- proceeds to deficit reduction.

The US Dept. of Energy (DOE) and the US Council for Automotive Energies *Hydrogen Production Roadmap* is one of the few such documents to mention solar fuels. It states that current water electrolysis units have relatively low production rates (100kg/day) and need to be scaled up to 50,000 kg/day.

One problem with a global carbon price is that if the carbon price is not high enough it will not incentivize GAP effectively. Substantial linking with overseas carbon markets means carbon price may be set overseas, threatening national sovereignty is some policy maker's views. It may be cheaper for some polluters to buy permits offshore. Although such a scheme may drive massive investment in renewable energy, continuous technological improvements will require stable and certain GAP incentive laws.

## 6. Conclusion

This paper has explored some of the international legal governance structures that may need to be developed or circumvented for enhanced global collaborations on solar fuels to occur. Particularly important in the former context is consideration that photosynthesis should be considered 'common heritage of humanity' under international law and the emerging international human right to enjoy the benefits of scientific progress and its applications. In the latter context some problems that could arise from trade and investment law have been explored.

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